APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/815,272	03/31/2004	Mark L. Brown	P18988	7485

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EXAMINER
PARK, IL WOO

ART UNIT	PAPER NUMBER
2182	

MAIL DATE	DELIVERY MODE
05/15/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

	Application No.	Applicant(s)
Office Action Summary	10/815,272	BROWN ET AL.
	Examiner	Art Unit	
	ILWOO PARK	2182	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS,
WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>05 March 2008</u>.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
    closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-31</u> is/are pending in the application.

   4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-31</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

   Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

   Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   a)☐ All   b)☐ Some * c)☐ None of:

   1.☐ Certified copies of the priority documents have been received.

   2.☐ Certified copies of the priority documents have been received in Application No. _____.

   3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
       application from the International Bureau (PCT Rule 17.2(a)).

   * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____

5)☐ Notice of Informal Patent Application

6)☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1.   A request for continued examination under 37 CFR 1.114, including the fee set

forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this

application is eligible for continued examination under 37 CFR 1.114, and the fee set

forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action

has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 3/5/08

has been entered.

2.   Claims 1, 8, 17, and 24 are amended in response to the last office action. Claims

1-31 are presented for examination.

Claim Rejections - 35 USC § 103

3.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

4.   Claims 1, 2, 5-18, and 21-31 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Yu [US 5,764,903] in view of Skazinski et al. [US 6,574,709 B1] and

Beardsley et al. [US 2004/026970 A1].

As for claim 1, Yu teaches an apparatus comprising:

an integrated circuit (IC) configured to receive [col. 4, lines 50-60] an input/output

(I/O) request to write data stored on at least one target device comprised in at least one

local storage array [e.g., local disk 16 in fig. 1; col. 1, lines 43-47] and generate [col. 10,

lines 33-37] one or more I/O transactions capable of writing data on at least one target device comprised in at least one remote storage array [e.g., remote disk 34 in fig. 1; col. 1, lines 43-47].

Though Yu discloses that the data mirroring includes at least one data block transmitted during said one or more I/O transactions which was not successfully written to said at least one remote storage array [col. 8, lines 59-64] and retries said one or more I/O transactions including data blocks, Yu does not explicitly disclose a counter configured to include at least one bit corresponding to the at least one data block if said at least one data block was not successfully written. Skazinski et al teach a counter configured to include at least one bit corresponding to the at least one data block which was not successfully written and identified as remained to be mirrored [e.g., bitmap1[0]=1, bitmap1[1]=1, bitmap1[2]=1 in col. 20, lines 1-19]. It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the counter including at least one bit corresponding to the at least one data block which was not successfully written in order to identify the data blocks failed for the retry. Though the combination of Yu and Skazinski et al teaches that the each bit indicates data still remained for mirroring when corresponding data block was not written to the remote storage array by setting the corresponding bit to 1, the combination does not expressly disclose that the manipulation of each bit corresponding to at least one data block is to be cleared when corresponding data block is successfully written to the storage array. Beardsley et al teach a counter having at least one bit corresponding to at least one data block. Beardsley et al further teach that the bit is configured to be set

when corresponding data block is still remained for mirroring and is configured to be cleared [step 62 in fig. 2] if corresponding data block is successfully written to a remote storage array. It would have been obvious to one of ordinary skill in the art at the time the invention was made to include a counter configured to clear at least one bit if corresponding data block is successfully written to a remote storage array which was not successfully written in order to increase feasibility in manipulation of bit to simply indicate that a data block is done mirroring when corresponding bit is cleared.

5.   As for claims 2 and 18, Yu teaches said integrated circuit is further capable of generating one or more I/O transactions capable of writing data on at least one target device comprised in at least one local storage array [col. 10, lines 33-37].

6.   As for claims 5 and 21, the combination of Yu and Skazinski et al teaches said local storage array and said remote storage array each comprises a redundant array of inexpensive disks (RAID) each comprising at least one of RAID Level 0, RAID Level 10, and RAID Level 1E storage arrays [Skazinski et al: col. 9, lines 5-8].

7.   As for claims 6 and 22, the combination of Yu and Skazinski et al teaches said local storage array and said remote storage array each comprises a transaction to stripe data on at least one of said of RAID Level 0, RAID Level 10, and RAID Level 1E storage arrays in response to said I/O request to write data stored on at least one target device comprised in at least one local storage array [Skazinski et al: col. 9, lines 5-8].

8.   As for claims 7 and 23, Yu teaches said integrated circuit capable of receiving [col. 11, lines 47-52] an input/output (I/O) request to read data stored on at least one target device comprised in at least one local storage array, said integrated circuit further

capable of generating [col. 10, lines 33-37] one or more I/O transactions capable of

reading data on at least one target device comprised in at least one remote storage.

9.   As for claim 8, Yu teaches a method comprising:

        receiving [col. 4, lines 50-60] an input/output (I/O) request to write data stored on

at least one target device comprised in at least one local storage array [e.g., local disk

16 in fig. 1; col. 1, lines 43-47]; and

        generating [col. 10, lines 33-37] one or more I/O transactions configured to write

data on at least one target device comprised in at least one remote storage array [e.g.,

remote disk 34 in fig. 1; col. 1, lines 43-47].

        Though Yu discloses that the data mirroring includes at least one data block

transmitted during said one or more I/O transactions which was not successfully written

to said at least one remote storage array [col. 8, lines 59-64] and retries said one or

more I/O transactions including data blocks, Yu does not explicitly disclose incrementing

at least one bit corresponding to the at least one data block which was not successfully

written. Skazinski et al teach incrementing at least one bit corresponding to the at least

one data block which was not successfully written and identified as remained to be

mirrored [e.g., bitmap1[0]=1, bitmap1[1]=1, bitmap1[2]=1 in col. 20, lines 1-19]. It would

have been obvious to one of ordinary skill in the art at the time the invention was made

to include the counter including at least one bit corresponding to the at least one data

block which was not successfully written in order to identify the data blocks failed for the

retry. Though the combination of Yu and Skazinski et al teaches that the each bit

indicates data still remained for mirroring when corresponding data block was not

written to the remote storage array by setting the corresponding bit to 1, the

combination does not expressly disclose that the manipulation of each bit corresponding

to at least one data block is to be cleared when corresponding data block is successfully

written to the storage array. Beardsley et al teach a counter having at least one bit

corresponding to at least one data block. Beardsley et al further teach that the bit is

configured to be set when corresponding data block is still remained for mirroring and is

configured to be cleared [step 62 in fig. 2] if corresponding data block is successfully

written to a remote storage array. It would have been obvious to one of ordinary skill in

the art at the time the invention was made to include a counter configured to clear at

least one bit if corresponding data block is successfully written to a remote storage

array which was not successfully written in order to increase feasibility in manipulation

of bit to simply indicate that a data block is done mirroring when corresponding bit is

cleared.

10.   As for claim 9, Yu teaches generating one or more I/O transactions to mirror data

on said local storage array and said remote storage array [col. 2, lines 16-24].

11.   As for claim 10, Yu teaches generating one or more I/O transactions to stripe

data on said local storage array and said remote storage array [col. 9, lines 35-42].

12.   As for claim 11, Yu teaches receiving [col. 11, lines 47-52] an input/output (I/O)

request to read data stored on at least one target device comprised in at least one local

storage array; and generating [col. 10, lines 33-37] one or more I/O transactions

capable of reading data on at least one target device comprised in at least one remote

storage array.

13.   As for claim 12, Yu teaches determining the status of said remote storage array, and, if said remote storage array is incapable of transmitting data in response to said one or more I/O transactions, regenerating said one or more I/O transactions to read data to said remote storage array at one or more preselected times [col. 6, lines 42-55; col. 11, lines 47-52].

14.   As for claim 13, Yu teaches storing information based on data unread from said remote storage array on said local storage array, and, retrieving said information based on data unread from said local storage array [e.g., col. 6, lines 53-56; col. 11, lines 47-52].

15.   As for claim 14, Yu teaches determining the status of said remote storage array, and, if said remote storage array is incapable of receiving data, regenerating said one or more I/O transactions to write data to said remote storage array at one or more preselected times [col. 6, lines 42-55].

16.   As for claim 15, Yu teaches storing information based on data unwritten data related to said I/O transactions to write data to said remote storage array, and, retrieving said information based on data unwritten data to said remote storage array [col. 6, lines 53-56].

17.   As for claim 16, Yu teaches copying data from said at least one target device comprised in said at least one remote storage array to said at least one target device comprised in said local storage array [col. 11, lines 50-52].

18.   As for claim 17, Yu teaches a system, comprising:

a circuit card comprising an integrated circuit (IC) configured to communicate in

accordance with a plurality of different communication protocols [e.g., col. 4, lines 8-11],

the circuit card (IC) configured to be coupled to a bus, and said IC(IC) configured to

receive [col. 4, lines 50-60] an input/output (I/O) request to write data stored on at least

one target device comprised in at least one local storage array [e.g., local disk 16 in fig.

1; col. 1, lines 43-47], said IC further configured to generate [col. 10, lines 33-37] one or

more I/O transactions configured to write data on at least one target device comprised

in at least one remote storage array [e.g., remote disk 34 in fig. 1; col. 1, lines 43-47].

Though Yu discloses that the data mirroring includes at least one data block

transmitted during said one or more I/O transactions which was not successfully written

to said at least one remote storage array [col. 8, lines 59-64] and retries said one or

more I/O transactions including data blocks, Yu does not explicitly disclose incrementing

at least one bit corresponding to the at least one data block which was not successfully

written. Skazinski et al teach incrementing at least one bit corresponding to the at least

one data block which was not successfully written and identified as remained to be

mirrored [e.g., bitmap1[0]=1, bitmap1[1]=1, bitmap1[2]=1 in col. 20, lines 1-19]. It would

have been obvious to one of ordinary skill in the art at the time the invention was made

to include the counter including at least one bit corresponding to the at least one data

block which was not successfully written in order to identify the data blocks failed for the

retry. Though the combination of Yu and Skazinski et al teaches that the each bit

indicates data still remained for mirroring when corresponding data block was not

written to the remote storage array by setting the corresponding bit to 1, the

combination does not expressly disclose that the manipulation of each bit corresponding to at least one data block is to be cleared when corresponding data block is successfully written to the storage array. Beardsley et al teach a counter having at least one bit corresponding to at least one data block. Beardsley et al further teach that the bit is configured to be set when corresponding data block is still remained for mirroring and is configured to be cleared [step 62 in fig. 2] if corresponding data block is successfully written to a remote storage array. It would have been obvious to one of ordinary skill in the art at the time the invention was made to include a counter configured to clear at least one bit if corresponding data block is successfully written to a remote storage array which was not successfully written in order to increase feasibility in manipulation of bit to simply indicate that a data block is done mirroring when corresponding bit is cleared.

19.   Regarding claims 24-31, these constitute the article comprising a storage medium having stored thereon instructions that when executed by a machine result in the limitations of the method disclosed in previously rejected claims. These present claims are rejected under the same basis.

20.   Claims 3, 4, 19, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yu, Skazinski et al, and Beardsley et al as applied to claims 1 and 17 above, and further in view of well known in the art.

        As for claims 3 and 19, though the combination of Yu and Skazinski et al teaches said local storage array and said remote storage array each comprises a redundant

array of inexpensive disks (RAID), the combination does not expressly disclose the

RAID comprises RAID Level 1 storage arrays.

However, it is well known in the art of RAID having RAID Level 0, RAID Level 1,

RAID Level 10, or RAID Level 1E storage arrays. At the time of the invention, it would

have been obvious to one of ordinary skill in the art to modify to include RAID Level 0,

RAID Level 1, RAID Level 10, or RAID Level 1E storage arrays in order to increase

applicability of mirroring and striping in the RAID of Yu.

21.   As for claims 4 and 20, the combination of Yu and well known in the art teaches

a transaction to mirror data on at least one of said RAID Level 0, RAID Level 1, RAID

Level 10, and RAID Level 1E storage array in response to said I/O request to write data

stored on at least one target device comprised in at least one local storage array [col.

10, lines 33-37; col. 1, lines 43-47].

Conclusion

22.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Ilwoo Park whose telephone number is (571) 272-4155.

The examiner can normally be reached on Monday through Friday from 9:00 AM to 5:30

PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Tariq Hafiz can be reached on (571) 272-6729. The fax phone number for

the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published

applications may be obtained from either Private PAIR or Public PAIR. Status

information for unpublished applications is available through Private PAIR only. For

more information about the PAIR system see http://pair-direct.uspto.gov. Should you

have questions on access to the Private PAIR system, contact the Electronic Business

Center (EBC) at 866-217-9197 (toll-free).

/Ilwoo Park/
Primary Examiner, Art Unit 2182
May 9, 2008